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TB CARE I

TB CARE I – Botswana Final Report

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Cover photo: GeneXpert roll out: training of health care workers. Source: photo archive of GeneXpert roll out NTP (Sidney Kololo)

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List of Abbreviations

AFB	Acid Fast Bacilli
ART	Anti-Retroviral Therapy
BNTP	Botswana National TB Program
BUP	Botswana-University of Pennsylvania Partnership
CDC	Center for Disease Control and Prevention
CHBC	Community Home Based Care
CMLT	Chief Medical Laboratory technician
COE	Center of Excellence
CSOs	Civil Society Organizations
CTBC	Community TB care
DOT	Directly Observed Treatment
DOTS	Directly Observed Treatment Short Course
DR	Drug Resistance
DR-TB	Drug Resistance TB
DRS	Drug Resistance Survey
DST	Drug Susceptibility Testing
EQA	External Quality Assurance
FDA	Food and drug administration
GFATM	Global Fund for AIDS, Tuberculosis and Malaria
IC	Infection Control
KNCV	KNCV Tuberculosis Foundation
LED	Light emitting diode
MDR	Multi Drug Resistance
MDRTB	Multi Drug Resistant Tuberculosis
M&E	Monitoring and Evaluation
MGIT	Mycobacteria Growth Indicator Tube
MoH	Ministry of Health
NFM	New Funding Model
NSP	National Strategic Plan
NTP	National TB Program
NTRL	National Tuberculosis Reference Laboratory
OR	Operational Research
PMDT	Programmatic Management of Drug-resistant Tuberculosis
POC	Point-of-care
PPM	Public Private Mix
QMR	Quarterly Monitoring Report
SADC	Southern Africa Development Community
SANAS	Southern Africa Accreditation Systems
SLD	Second-Line Drug
SNRL	Supra National Reference Laboratory
SOP	Standard Operating Procedures
SRs	Sub-recipients
SS+	Sputum Smear positive
SS-	Sputum Smear negative
STA	Senior Technical Advisor
TA	Technical Assistance
TB	Tuberculosis
TFM	Transitional Funding Mechanism
USAID	United States Agency for International Development
XDR-TB	Extensively drug-resistant tuberculosis

Executive Summary

KNCV Tuberculosis Foundation is the lead partner and sole implementer in Botswana of TB CARE I, a four-year project funded by the United States Agency for International Development (USAID). The total buy-in from the country USAID mission was in the amount of \$US 1,363,667 for the life span of the project. The project focused mainly on provision of technical support from both in-country and periodic international expert technical advisors in various areas of TB control.

The Botswana country office was comprised of one Senior Technical Advisor (STA) based at the Botswana National Tuberculosis Control Program (BNTP) and one Chief Medical Laboratory Technician (CMLT) based at the National Tuberculosis Reference Laboratory (NTRL). One senior technical laboratory advisor was also based at NTRL from the start of TB CARE I up to November 2011 and then remote and periodic in-country support continued for the remaining period of the project. International TB CARE I consultants provided supervision and technical support through backstopping, country visits, facilitating the training of recruited staff and targeted missions.

KNCV has been working closely with the Botswana Ministry of Health since 2006. Since that time, KNCV has actively supported capacity building at both the National TB program and the National TB reference laboratory. TB CARE I project has provided comprehensive technical support to the Ministry of Health (NTP & NTRL) and with strong partnership enabled achievement of the following targets:

- Community TB Care Expansion -Community TB care has been expanded in the country and uptake has improved from 45% in 2011 to 65% in 2013. A national evaluation of community TB care implementation in Botswana has been completed. The sustained scale-up of community TB care through increased engagement of civil society will go a long way in empowering TB patients and affected communities to meaningfully participate and contribute to TB control.
- PPM Engagement - A national Public-Private Mix (PPM) framework for engagement of the private sector in TB control has been finalized and disseminated with TB CARE I support. Two hundred seventy eight (278) health care workers from the private sector were trained on TB control using the guideline. About 20 private health care facilities are currently engaged in the management of TB. Over 70 TB patients have been managed in the private sector under the PPM scheme.
- TB control in the mining sector - TB CARE I supported the NTP in addressing TB control in the mining sector in Botswana. TB CARE I Botswana conducted a mission to assess the TB control situation in the mining sector and supported NTP in the development of activities to address TB in the mines.
- NTRL Accreditation and SNRL status - The NTRL has been successfully accredited and received its accreditation to ISO 15189 through the South Africa Accreditation Systems (SANAS) and continued to retain its status as an ISO 15189 accredited laboratory. The same laboratory was selected as a SADC Regional Supranational Reference Laboratory.
- GeneXpert Roll-out - GeneXpert machines have been rolled out to 34 health facilities (14 sites through CDC Botswana) placed at laboratory and point-of-care sites covering all the 28 health districts in the country. TB CARE I contributed to the development of a comprehensive roll-out plan for GeneXpert implementation. TB CARE I also supported training of staff, updating of GeneXpert algorithms in-line with WHO recommendations and M&E tools, conducting sites assessment, selection of appropriate sites and deployment of the machines at the health facilities.
- Routine Audiology Services -Tele-audiology services (Kudu wave) have been established in all five MDR-TB treatment initiation sites in Botswana as a result of TB CARE I technical guidance. As a result, routine audiology services are now provided in all of the MDR-TB treatment initiation sites linked to the national Center of Excellence in Princes Marina Hospital (PMH) in Gaborone.

- NSP Development - TB CARE I provided technical assistance to develop a robust national strategic plan for TB control (2013 – 2017). The strategy was developed through regular consultative meetings with stakeholders including CSOs, extensive review of recommendations from existing reviews, assessments and mission reports. TB CARE I sub-contracted a budget expert to cost the strategic plan. TB CARE I has also supported development of the addendum to the current TB Strategic Plan 2013 – 2017 in-line with the WHO post-2015 End TB strategic plan and the Global Fund New Funding Model requirements. TB CARE also supported the Epidemiological and Impact Analysis (Epi-analysis) and TB program desk review.
- GFATM Concept Note -TB CARE I has been closely involved in Global Fund (GFATM) support and concept note (CN) development in Botswana: Round 5 Global Fund, Transitional Funding Mechanism (TFM), development of single TB/HIV concept note under the new funding model.
- TB Prevalence Survey – TB CARE I supported the development of a Prevalence Survey protocol for Botswana

Overall the national response to TB is on track, though still much needs to be done to close the gap to set national targets. Botswana has still unacceptably high burden of TB in comparison to global incidence.

Introduction

TB CARE I in Botswana with sole implementation by KNCV Tuberculosis Foundation was awarded a budget of \$US 1,363,667 over the life span of TB CARE I (APA1 – APA4) focused on the provision of technical support from both in-country and periodic international expert technical advisors in various technical areas of TB control.

The Botswana country office is comprised of two staff members: one STA full-time seconded to the National Tuberculosis Control Program (NTP) and one Chief Medical Laboratory Technician-EQA (CMLT-External Quality Assurance) full-time based at the NTRL. One senior technical laboratory advisor was also full-time based at NTRL from the start of TB CARE I up to November 2011 and then remote and in-country support continued from a senior regional consultant. Since May 2014 (following the departure of CMLT), she was relocated to Botswana and has been based at the NTRL until the end of the project.

The STA's role was to provide comprehensive technical support to the NTP in all six technical areas of the Stop TB strategy (Programmatic Management of Drug Resistant Tuberculosis (PMDT), Laboratory strengthening, TB/HIV collaborative activities, Monitoring and Evaluation (M&E), Community TB Care and TB infection control) with a main focus on Community TB Care (CTBC) expansion.

The CMLT supports the NTRL in accreditation (quality management systems), roll out of new diagnostics-LED Fluorescent microscopy and the GeneXpert MTB/RIF test, External Quality Assurance (EQA) for the Botswana national AFB microscopy laboratory network and training of laboratory technicians from peripheral laboratories.

TB CARE I has also collaborated with PEPFAR supported partners in country in the following technical areas: CDC Botswana (TB/HIV collaboration, infrastructure for MDR-TB control & human resources for health, laboratory systems strengthening, including procurement of laboratory equipment), Botswana University of Pennsylvania partnership (BUP) (clinical management of drug resistant TB, diagnosis of TB in children through the use of gastric aspirate), and I-TECH (M&E systems strengthening, training and clinical mentorship for health care workers).

Core Indicators

TB CARE I has seven core indicators that the program as a whole is working to improve across all countries. Table 1 summarizes the core indicator results across the life of the project for TB CARE I-Botswana, as well as the Tuberculosis Control Assistance Program (TB CAP), the precursor to TB CARE I, which our coalition also led.

Table 1: TB CARE I core indicator results for Botswana

		C1. Number of cases notified (all forms)	C2. Number of cases notified (new confirmed)	C3. Case Detection Rate (all forms)	C4. Number (and percent) of TB cases among healthcare workers	C5. Treatment Success Rate of confirmed cases	C6. Number of MDR cases diagnosed	C7. Number of MDR cases put on treatment
TB CAP	2005	NA	NA	NA	No data	NA	NA	NA
	2006	9,035	8,327	NA	No data	73%	86	55
	2007	8,454	7,735	NA	No data	75%	94	47
	2008	9,645	8,550	NA	No data	71%	102	58
	2009	9,088	7,997	60%	No data	79%	142	101
	2010	7,013	6,560	70%	No data	81%	105	95
TB CARE I	2011	6,603	5,865	71%	37	81.5%	46*	44*
	2012	6,829	5,785	75%	65	81.5%	52*	43*
	2013	7,088	5,915	84%	NA	NA	97	97

*The apparent decrease in notification in 2011 & 2012 is likely a consequence of the extended interruption of services at NTRL for culture and DST.

Universal Access

TB CARE I provided technical support to the BNTP for the expansion of the Community TB Care program. The main focus was to strengthen collaboration between the community TB Care Program (CTBC) and the community home based care (CHBC) program at the Department of HIV/AIDS Prevention and Care (DHAPC), resource mobilization for the successful implementation of community TB care (from the Global Fund and other sources), national evaluation of community TB care implementation in the country and capacity building of civil society organizations.

Table 2: Technical Outcomes

#	Outcome Indicators	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
1	Population covered with Community TB Care (enrollment under community TB care)	Proportion of eligible TB patients on treatment who have been enrolled under community TB care	45% (2011)	75% (4,338/5,785)	65% (3,760/5,785)

Key Results

In order to address inadequate coverage of community TB care which was at 45% (2011) to the national target of 75%, TB Care I provided technical support to BNTP in capacity building and supportive supervision for the expansion and improving implementation of the community TB care program. The uptake of community TB care has increased from 45% in 2011 to 65% in 2013. This translates to about 3,760 TB patients have been enrolled under community TB Care model. The observed gains in the scale-up are largely attributed to the contributions from Civil Society Organizations, through funding from the Global Fund and continued technical support from TB CARE I and other partners.

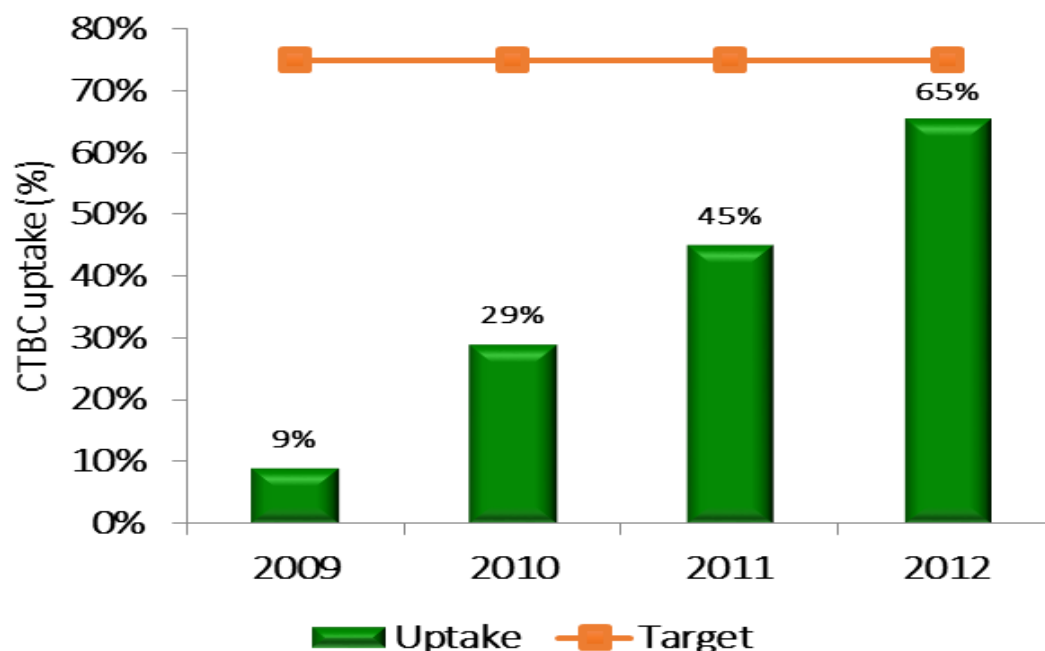


Figure 1: Trends in Community TB Care uptake, Botswana, 2009-2012

The in-country Senior Technical Advisor who joined the Botswana TB CARE I project during the second year of TB CARE I (APA 2) was seconded full time to the BNTP. His role was to provide comprehensive

technical support to the NTP in all six technical areas of the core Stop TB strategy with a main focus on Community TB Care (CTBC).

TB CARE I facilitated two rounds of training targeting community TB care providers and CSOs on community TB care, community TB infection control and revised indicators for the Global Fund transitional funding mechanism (GF/TFM). A total of 85 participants (F=50, M=35) from GF/TFM sub recipients (SR) were trained in implementation, as well as the timeliness and completeness of community TB care activity reporting to the Global Fund. Quality of reports from SRs has improved thereafter.

TB CARE I in partnership with the BNTP and the Department of HIV/AIDS Prevention and Care (DHAPC) supported the development of integrated community TB care and community home based care (CHBC). TB CARE I organized regular stakeholders consultative meetings to finalize the harmonization of CHBC and CTBC operational guidelines. The draft operational guideline was completed incorporating key components of CTBC, HIV and other programs. This is aimed to facilitate the harmonization of the two services both at program and implementation level and seeks to leverage funds used in the two programs to expand the reach of CTBC to areas which have not been previously covered. Although the harmonization of the CTBC and CHBC programs has made much progress, there has been a new strategic direction from the Ministry of Health (MoH) to also ensure that other chronic health conditions such as diabetes, cancers and hypertension to be included in the community care package. This has therefore led to delays in the full implementation of this integrated approach.

Thus to improve the community care model, TB CARE I in collaboration with other partners has supported NTP to conduct a national evaluation of community TB care implementation in Botswana. TB CARE I supported the whole course of the evaluation from development of the protocol to implementation and dissemination. The evaluation was designed to understand the extent to which the six different approaches (models) of Community TB Care (CTBC) in Botswana have contributed to the attainment of TB control targets in the country. The objective was to evaluate the effectiveness and acceptability of community TB care models implemented in the country and explores their sustainability. The study aimed also to document lessons learnt from CTBC implementation over the last years. The results of the study (summarized below) will guide the NTP/MoH to adopt an appropriate CTBC approach to be scaled up, taking into consideration the declining funding in the near future.

Identified barriers to effective care of TB patients in the community were:

- Non-adherence to treatment due to poor relationships with service providers and volunteers
- Alcohol abuse
- High mobility of patients, which makes monitoring difficult
- Staff shortages
- Poor infection control practices
- Inadequate knowledge of TB among patients and the community, and
- Stigma.

All the different approaches of community TB implemented in the country were acceptable and deemed effective. CTBC approaches managed by Civil Society Organizations were noted to be significantly effective for hard to reach populations and acceptable despite poor sustainability. Community TB care success was perceived to be associated with availability of volunteer "incentives" (mainly of financial nature) or enablers of their activities in the community (e.g. transportation, telephone expenses).

Hence the study suggests that the provision of incentives or enablers to volunteers, and social and livelihood support to patients must be considered if the objectives of CTBC are to be achieved. Regardless of approach, comprehensive training for volunteers needs to be ensured and also the implementation of strategies to address the knowledge gap among the community regarding TB and infection control. The findings indicate that it is necessary to promote the Patient's Charter for TB Care to reduce stigma and to assess the effectiveness of existing procedures to monitor the activities of volunteers by health facilities. Another interesting key lesson to be drawn from this study is that the

concept of addressing social determinants of health in TB service provision was largely appreciated and associated with the likelihood of completing treatment. An abstract on these results has been presented at the Union TB Conference in Barcelona in October 2014.

Success story

Supporting Community TB Care (CTBC) activities in Botswana through acquisitions and leveraging in country collaboration

Botswana is an upper-middle-income country (UMIC) with an estimated population of 2 million people with a decentralized health system where over 90% of services are delivered through public hospitals, clinics, health posts and mobile posts. However due to the vast size of the country, long distances and transport fees prohibit some patients from accessing health facilities. This has led to high defaulter rates and poor treatment success rates as well as an increase in the emergence of MDR-TB which may be related to poor management with DOTS. In 2007 Botswana started implementing the CTBC initiatives and key success has been recognized. With support from the Global Fund Round 5 grant Botswana expanded its CTBC activities to 45% of the TB patients in 2011. CTBC has contributed to improved TB case finding and treatment outcomes.

Key stakeholders have been involved in this initiative that have built strong linkages and trust with communities in which they work in. To continue to expand these services, Botswana looked forward to a successful Global Fund Round 11 application, however with the cancellation of GF R11 continuation of these essential services and expansion of the CTBC initiatives was no longer possible. An opportunity to redeem the situation arose with the call for proposals for the Global Fund Transitional Funding Mechanism (TFM). In collaboration with partners, TB CARE I in country staff, an international consultant from the KNCV and a regional budget consultant supported the preparation for the TFM proposal which was successful with a budget of about \$2.7 million.

The funds will be used to support the continuation of CTBC activities in-country, which are key to the DOTS program. Key gains have been noted with expansion of the CTBC activities from 45% (2011) to 65% in 2012.

Public Private Mix (PPM): Meaningful engagement of all care providers, particularly private health care providers, in TB control has remained low in Botswana for quite some time. TB CARE I has been supporting the implementation of Public Private Mix (PPM) activities in Botswana. Through a consultative process with the private sector and all stakeholders, TB CARE I has supported the finalization and dissemination of Botswana National Public-Private Mix (PPM) framework for engagement of private sector in TB control. The guideline has been printed and disseminated.



Figure 2: PPM Training, 2012, Palapye, Botswana

Consequently, two hundred seventy eight (278) health care workers from the private sector (physicians, nurses, pharmacists and pharmacy technicians) were trained using the new PPM guideline during the last 4 years. About 20 private health care facilities (in 8 districts) are currently engaged in the management of TB. Over 70 TB patients have been managed in the private sector under the PPM scheme.

TB control in the mining sector: TB CARE I supported the NTP in addressing TB control in the mining sector in Botswana. With the support of TB Care I Regional Consultant, TB CARE I Botswana conducted a mission to assess the TB control situation in the mining sector and supported NTP in the development of activities to address TB in the mines. In Botswana, TB in the mines is related to internal migration and temporal migration of mine-workers to South Africa. The mines in Botswana are mostly diamond mines (7 large mines) with a large number of TB patients per population. In addition Botswana sends mine-workers to work in South African mines but the number of migrant mine workers is not well known.

Activities related to TB in mining in Botswana included: organization of a sensitization meeting with key stakeholders including the mining companies, a situation analysis (mapping of partners, determine the magnitude of the problem of TB related to mining in Botswana), establishment of PPM linkages between the Mining Companies and the NTP, and introduction of the Patients' Charter for Mine workers.

The mission has found out that Botswana has well-established public private linkages with the mines and recommended to share the Botswana's experience in the region (during SADC NTP Managers Meetings or the Union Conference). The NTP is also advised to collect an overview of all registered mines from the Ministry of Mines and Minerals in order to ensure that all are linked to the NTP. The NTP is also advised to streamline TB notifications in the mines to the NTP surveillance system. The NTP has been following-up on the recommendations from the mission.



Figure 3: Left: Drilling to prepare for blasting. Right: Examining materials at bottom of the mine pit

Laboratories

Table 3: Technical Outcomes

#	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target	Result
				Y4	Y4
1	Number of local staff trained on smear-microscopy including external quality assurance	Number of local lab techs trained or retrained at the NTRL (1 week course) every two years by September 2011. Note: this is an ongoing activity from TB CAP but the denominator is set to "0" for TB CARE	0 (2011)	NA	128 lab techs (62F & 66M)
2	Botswana NTRL is successfully accredited by SANAS	SANAS provides written proof of passing accreditation for Botswana NTRL. NTRL has implemented a quality management system and is accredited	No (2011)	Maintain the accreditation status	NTRL accredited & retained its status as an ISO 15189 accredited laboratory
3	Laboratories with working internal and external QA programs for tests that they provide including: a) smear microscopy, b) culture, c) DST, and d) rapid molecular test Numerator: Number of laboratories enrolled in EQA program meeting description above both nationwide and TB CARE areas. Denominator: All laboratories (national and TB CARE areas separately) that perform one or more of the above TB diagnostics.	Number (percentage of) laboratories enrolled in EQA program meeting description above both nationwide and TB CARE areas/All laboratories (national and TB CARE areas separately) that perform one or more of the above TB diagnostics. Laboratories have successfully implemented a mechanism for performing internal quality control (e.g. Performing control samples, quality reagents etc.), blinded rechecking and supervision visits). Participating laboratories should have met WHO standards for QC/EQA results. Both laboratories, supervising and participating have to keep data on results for verification.	100% (52/52 labs) (2011)	EQA coverage remains at 100% (52/52) (2013)	100% (52/52) (2014)
4	Laboratories demonstrating acceptable EQA Performance.	This WHO indicator measures the percent of laboratories enrolled in EQA for smear microscopy and/or culture/DST	52 (100%)	52 (100%)	52 (100%)
5	Diagnostic sites offering advanced technologies for TB or drug-resistant TB	Number of diagnostic sites, in which GeneXpert MTB/RIF, HAIN MTBDRplus or liquid Culture/DST are implemented and routinely used for diagnosis, stratified by testing type	1 GeneXpert MTB/RIF, 0 HAIN 0 liquid culture/DST (2011)	34 GeneXpert MTB/RIF, 1 HAIN MTBDR plus 1 liquid culture/DST	34 GeneXpert MTB/RIF has been rolled out (lab & POC), 1 HAIN MTBDR plus 1 liquid Culture/DST

Key Results

TB CARE I Botswana seconded one Chief Medical Laboratory Technician (CMLT) to the National TB Reference Laboratory. He supported the NTRL in accreditation (quality management systems), External Quality Assurance (EQA) for the Botswana national AFB microscopy laboratory network, roll out of new diagnostics-LED Fluorescent microscopy and the Gene Xpert MTB/RIF test, and training of laboratory technicians from peripheral laboratories.

One senior technical laboratory advisor was based at NTRL from the start of TB CARE I up to November 2011 and then continued to support from regional office as a senior regional consultant. Significant support from the Senior Technical Lab Advisor provided by TB CARE I enabled continued advancements or lab services in Botswana's National TB Lab program. The Advisor supported the NTRL in scaling up liquid culture, first and second line DST and the introduction of molecular testing techniques. The Advisor also supported development of an SOP package for validation of MGIT DST, an M&E tool for laboratory quality indicators and trained 12 technicians (6 males and 6 females) in using the package. The regional laboratory consultant relocated to Botswana in May 2014 following the departure of chief laboratory technician. She has been coordinating the previous responsibilities of the CMLT and ensured continued technical support to the NTRL.

Botswana hosted a core project to pilot a Laboratory Strategic Planning Handbook and developed a draft TB specific laboratory strategic plan for the country. Through a core project mechanism, two international consultants provided support in the development and finalization of a TB laboratory strategic plan.

During the second year of TB CARE I (APA2) in March 2012, the Botswana NTRL was accredited to ISO 15189 international Standard by the South African National Accreditation Systems (SANAS) and continued to maintain this status. The NTRL was also selected as a SADC regional supranational reference laboratory, TB CARE I supported implementation of the quality management system and strengthening of culture and drug susceptibility testing capacity which were among the key criteria for selection.

The NTRL maintained its accreditation to ISO 15189 international Standard after a successful surveillance audit from SANAS. A memorandum of understanding selecting the same laboratory as a SADC Regional Supranational Reference Laboratory was signed after a successful follow-up assessment by a SADC consultant. TB CARE I also continued to support 100% implementation of the EQA by all laboratories in the country's TB laboratory network.

TB CARE I through in-country and periodic international expert consultants continued to take the lead in building capacity for culture, first and second line drug susceptibility testing using liquid media and molecular techniques. In addition TB CARE I supported NTRL with its continued maintenance of accreditation through strengthening of the quality management system. Strengthening of DST capacity for first- and second-line testing to decrease turn-around times of results continued with a mission from the regional laboratory consultant who provided technical input into the process to help reduce contamination challenges at the NTRL. The validation of the first- and second-line testing was finally completed and samples for EQA sent to an SRL.

The NTRL quality management system was supported with the annual review of safety SOPs and also with technical input in provision of feedback to the SANAS for addressing recommendations of another successful annual SANAS external audit, whereby the NTRL has retained its status as an ISO 15189 accredited laboratory.

TB CARE I supported the NTRL as it went through a successful Division of AIDS audit for participating clinical trial sites in 2012.

TB CARE I (via the core project) supported the development of Practical Handbook for National Strategic Planning for Botswana; participation of Botswana in the project has been endorsed by the MoH. A Senior Consultant from KNCV Central Office was the lead writer for the development of the handbook and was the coordinator of the in-country pilot testing in Botswana. Lessons learned from

Botswana informed *The Practical Handbook for National TB Laboratory Strategic Plan Development*, which is available for download from the TB CARE I website (<http://www.tbcare1.org/publications/toolbox/lab/>).

LED Fluorescent microscopy: LED (light emitting diode) Fluorescent microscopy has been rolled out to 11 high-volume facilities with 9 facilities having completed validation and ready to routinely use this technology. Introduction of the LED Fluorescent microscopy to the high volume sites will help reduce workload and improve the sensitivity of smear microscopy in the country. LED Fluorescent smear microscopy EQA was successfully started at eight high volume laboratories, three LED smear microscopy workshops were conducted and 18 (6 female) laboratory technicians were trained in a bid to improve the quality of smear microscopy in the country.

Gene-Xpert Rollout: Working in collaboration with CDC Botswana and other partners, TB CARE I has supported the rollout of GeneXpert. TB CARE I contributed to the development of a comprehensive roll-out plan for GeneXpert implementation. The plan incorporated the anticipated cost projections for the next 5 years by considering all costs and a revised diagnostic algorithm. GeneXpert machines have been installed in 34 (14 sites through CDC Botswana) health facilities (laboratory and point-of-care) covering all the 28 health districts across the country.



Figure 4: Training of HCWs on GeneXpert, Botswana

TB CARE I supported training of staff, updating of GeneXpert algorithms in-line with WHO recommendations and M&E tools, conducting sites assessment using a TB CARE I structured checklist for the deployment of GeneXpert machines, selection of appropriate sites and deployment of the machines at the health facilities. Four to five health care workers (laboratory technicians and nurses) per each site were trained for 3 days on GeneXpert testing. The trainings were organized on-site and consisted mainly of practical sessions. Two training-of-trainers sessions were conducted for staff at the NTRL to further increase the pool of GeneXpert trainers.

In order to strengthen the GeneXpert implementation process at country level, TB Care I (through the core project mechanism) successfully hosted a 3-day regional GeneXpert roll-out workshop in Botswana. Around 100 participants from 11 African countries came together in July 2013 in Gaborone, Botswana, for the second African Regional Training Workshop on GeneXpert. Participants included national TB and HIV/ AIDS program staff, clinical experts and laboratory experts from 11 countries: Ethiopia, Kenya, Malawi, Mozambique, Namibia, Nigeria, Tanzania, Uganda, Zambia, Zimbabwe and South Africa. The event, sponsored by TB CARE I, PEPFAR and the African Society for Laboratory Medicine (ASLM), aimed to support countries with the further roll-out and quality ensured usage of

Xpert. Special focus was given to the use of this new diagnostic test for the rapid detection of TB among PLHIV.

TB CARE I (via the core project mechanism) supported the participation of NTP and NTRL staff in the African Region GeneXpert roll-out workshop held in May 2012 in Mombasa, Kenya. The workshop has facilitated the development of a country GeneXpert roll-out plan.

Programmatic Management of Drug Resistant TB (PMDT)

Table 4: Technical Outcomes

#	Outcome Indicator	Indicator Definition	Baseline (Year/ timeframe)	Target Y4	Result Y4
1	Treatment success rate	MDR-TB patients who have completed the full course of MDR-TB treatment, have clinically improved and have been consistently culture-negative from samples collected at least 30 days apart (with at least 5 consecutive results) for the last 12 months of treatment	54% (2008)	80% (84/105)	67% (70/105)

Key Results

In year 4, TB CARE I also focused on supporting Programmatic Management of Drug Resistant TB (PMDT).

TB CARE I supported:

- Annual Green Light Committee missions to Botswana with coordination of the mission's visits and meeting with partners
- Organizing Drug Resistant-TB clinical seminars with health care workers from the 5 MDR-TB treatment initiation sites. It is organized bi-annually every year and helps to share experiences and best practices in the management of DR-TB in an effort to optimize treatment outcomes. The seminar was well attended by 60 participants including in-country partners with representation from all MDR-TB treatment sites.



Figure 5: MDR-TB Clinical Seminar, October 2013, Mahalapye, Botswana

- Intensive course on Clinical Management of MDR and XDR-TB: In Year 4, in collaboration with the Union and other partners TB CARE I organized a 5-day intensive training in Gaborone, Botswana on the Clinical Management of MDR and XDR-TB. Thirty-five health care workers linked to the clinical and operational management of TB, HIV and MDR-TB in Botswana participated in the training. The course was primarily targeted to clinicians who are responsible for the clinical management of MDR-TB cases. Included were also NTP staff and other technical partners implementing tuberculosis control activities in settings where clinical management of drug-resistant tuberculosis is being expanded.
- TB CARE I has also facilitated the participation of 2 NTP staff to the Center of Excellence in Rwanda to attend a PMDT training and an advanced laboratory training.



Figure 6: Training of HCWs on management of MDR & XDR-TB, July 2014, Gaborone, Botswana

Establishment of Tele-audiology services for DR-TB cases management in Botswana:

Successful MDR-TB treatment involves the use of aminoglycosides (Amikacin in the Botswana regimen) which are associated with high rates of hearing loss. About two-thirds of patients in Botswana treated with a second-line drug regimen had developed hearing loss, mostly irreversible. Unfortunately, audiology screening was not done routinely because of lack of Audiologist and inadequate TB infection control in the closed booth testing. Patients with hearing loss were identified too late for any meaningful remedial action. TB CARE I supported the NTP in introducing a Tele-audiology services (KUDU Wave) as a feasible option for Botswana. TB CARE I provided technical support from the inception of the idea, helping to develop and present a concept note to MoH officials and the MDR-TB Working Group.



Figure 7: Kudu wave

This is a portable, mobile and cost efficient Clinical Diagnostic Audiometer that is US FDA approved and widely used in South Africa. TB CARE I also helped to mobilize resources; the initiative was funded by CDC Botswana through existing PEPFAR funding.

As a result, routine audiology services are now provided in all of the 5 MDR-TB treatment initiation sites in Botswana, linked to the national Center of Excellence (CoE) in Princes Marina Hospital (PMH) in Gaborone. TB CARE I has been closely supporting the proper implementation and success of the project.

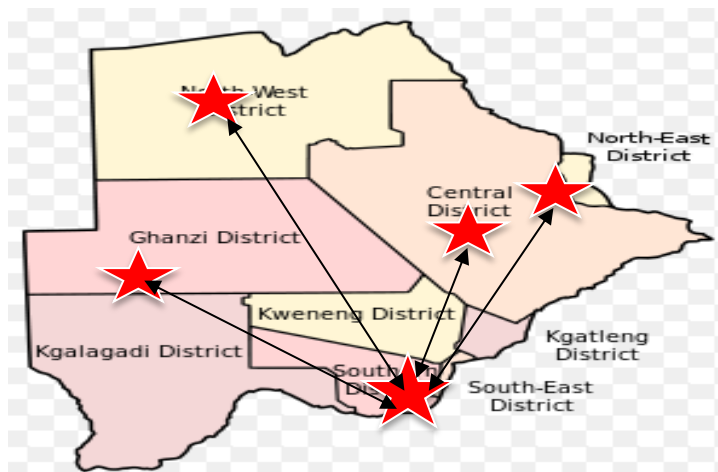


Figure 8: DR TB sites with Audiology services

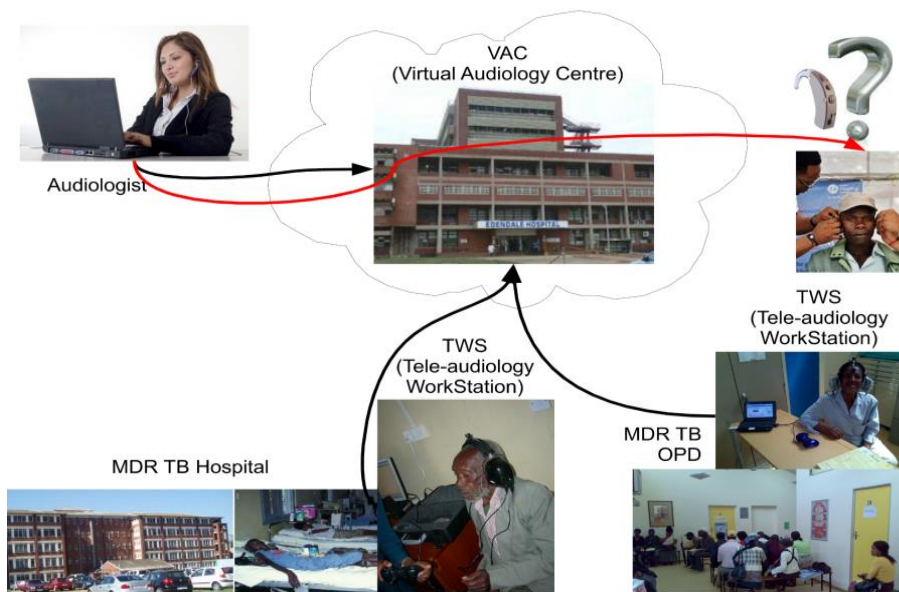


Figure 9: Set up of tele-audiology services, flow of patient's screening result to Audiologist at CoE and feed back to the treating physician

TB CARE I's support to Global Fund implementation

TB CARE I has been closely involved in the development and implementation of Global Fund (GFATM) grant in Botswana: Implementation of Round 5 Global Fund, Development and implementation of Transitional Funding Mechanism (TFM), grant negotiations, development of single TB/HIV concept note under the new funding model. TB CARE I has also supported the closure of the previous Round 5 Global Fund TB grant and transitional funding mechanism (TFM). TB CARE I played an instrumental role with support by the local staff, a sub-contracted regional budget expert and a KNCV international consultant.

With regard to the Global Fund application under the New Funding Model (NFM), TB CARE I supported the development of a single TB/HIV concept note through both in-country and international consultant TA. The concept note is scheduled to be submitted on January 30, 2015.

TB CARE I has provided technical assistance to develop a robust national strategic plan for TB control (2013 – 2017). The strategy was developed through serial consultative meetings with stakeholders including CSOs, extensive review of recommendations from existing reviews, assessments and mission reports. TB CARE I sub-contracted a budget expert to cost the strategic plan. The strategic plan was endorsed by MoH and key stakeholders.

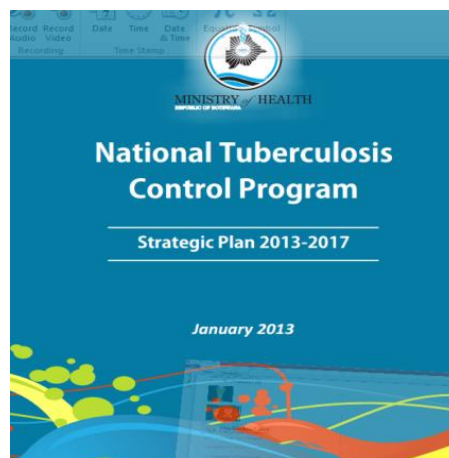


Figure 10: National Tuberculosis Control Program Strategic Plan 2013-2017

TB CARE I has also supported development of the addendum to the current TB Strategic Plan 2013 – 2017 in-line with the WHO post-2015 End TB strategic plan and the Global Fund New Funding Model requirements. TB CARE I also supported the Epidemiological and Impact (Epi) analysis and desk review in preparation for the development of the addendum. The addendum has been finalised, costed and is being used for concept note development and Global Fund application under the new funding model. TB CARE I also supported the development of a Technical Assistance (TA) plan for the implementation of the Strategic Plan 2013–2017. This was developed per the requirement of the new Global Fund model. The TA plan has been incorporated into the strategic plan.

TB CARE I in collaboration with partners assisted the NTP to develop a TB prevalence survey protocol (co-financed by the Global Fund) of which a final draft is now available. However, financial resources were not available. The Ministry of Health is working with partners to mobilize resources to conduct the survey.

The Way Forward - Lessons Learned & Recommendations

Reflecting on TB CARE I results through the lenses of the US Government TB strategy and the Post-2015 Global TB Strategy, there are many lessons to learn from TB CARE I and new approaches to prioritize going forward. Lessons learned from the project and an analysis of strategic priorities for the country is summarized below, which can inform future work and investment in the country.

Universal Access

The sustained scale-up of community TB care through increased engagement of civil society will go a long way in empowering TB patients and affected communities to meaningfully participate and contribute to TB control. Treatment outcomes have improved. Despite notable improvements in CTBC uptake over the years, coverage at the moment (65%) is below the established national target of 75%. In addition, funding support for scale up of CTBC activities continues to diminish with the potential to undermine current gains. Appropriate monitoring and evaluation tools and relevant indicators to adequately capture and determine community contribution to TB care is lacking.

The national evaluation of CTBC implementation carried out during APA4 has documented lessons learnt and best practices from CTBC implementation over the last years. The effort to scale-up and strengthen community TB care implementation in the country should be sustained and guided by the evaluation report, recent WHO led Epi-analysis and desk review of TB program. It is recommended to develop appropriate recording and reporting tools and a set of indicators to capture community contribution in TB prevention and care.

TB control among vulnerable populations (prison populations, mine workers, children, and remote farming communities) is not adequately addressed. Hence there is a need to support BNTP to intensify active TB case-finding and quality treatment provision among the key affected populations using innovative context-appropriate models.

Laboratories

Botswana has 670 health facilities delivering TB treatment, but only 52 sites have TB diagnostic services. Although adequate population coverage is achieved (coverage of 1 microscopy laboratory per 40,000 population), geographical realities tend to limit rapid access to diagnostic services. Consequently this results in prolonged turn-around times for TB laboratory results.

The country is considering the adoption of the Xpert MTB/RIF test as 'initial TB diagnostic test' for all presumptive TB cases. In addition, in order to strengthen sputum transport and maximize utilization of full range of available new TB diagnostic technologies, develop Expert-sites as 'hubs' supporting peripheral facilities. This will require capacity building HCWs, revision of the diagnostic algorithm, case detection definitions, treatment outcomes, and recording & reporting tools. However BNTP staff has limited capacity in materialising this plan.

There is need to provide continued technical support to NTP in the phased implementation of this initiative in the years to come. Support BNTP to be actively engaged in the forecasting of laboratory consumables/ reagents to ensure alignment of procurement to programme needs based on disease epidemiology. There has been also a continued challenge in logistics management systems and limited capacity for drug and other lab supplies forecasting at sub-national level resulting in stock outs in certain instances. Inadequate human resource capacity at the health laboratories at all levels has affected quality of care and optimum service delivery.

PMDT

The growing burden of drug resistant TB in the country, if left unchecked, will potentially undermine any meaningful gains in control efforts. The trends of MDR-TB, over the four national drug resistance surveys clearly confirm such concerns. Analysis of successive national drug resistance survey results

revealed an increase by 12-fold in the prevalence of MDR-TB in the country between 1995 (1st DRS) to 2008 (4th DRS) from 0.2% to 2.5% in new cases.

Treatment initiation of drug resistant forms of TB was decentralized to five sites across the country, predominantly ambulatory with selective isolation for those very ill and/or with limited home capacity for adequate isolation. With the support from PEPFAR and GFATM, a 17-bed MDR-TB isolation ward in Gaborone (Extension 12 clinic) was refurbished and completed.

TB CARE I in collaboration with CDC and other partners supported the establishment of tele-audiology services (KUDU wave) in the country. As a result, routine audiology services are now provided in all of the 5 MDR-TB treatment initiation sites in Botswana, linked to the national Center of Excellence in Princes Marina Hospital (PMH) in Gaborone. The following areas need continued support in the coming year:

- Expedite plans for conducting the next (5th) DRS survey for anti-TB drugs, while strengthening routine DR-TB surveillance.
- Revise and update 2009 version of National guidelines for programmatic management of drug-resistant tuberculosis (PMDT) in line with the recommendations of the recent WHO update.
- Support closely the proper implementation and success of tele-audiology (KUDU wave) project

Annex I: Knowledge Exchange

Below is a list of tools and publications that were developed with support from TB CARE I Botswana over the life of the project. Please contact the project staff for copies of or links to any of the listed documents.

Technical Tools and documents:

- Harmonized TB, TB/HIV training module
- National PPM framework for engagement of private sector in TB control
- BNTP Annual Report 2010-2011
- BNTP Annual Report 2012
- Botswana National TB strategic plan 2013-2017
- Botswana National TB strategic plan addendum 2015-2017
- TB specific laboratory strategic plan
- GeneXpert roll out plan: 2013 – 2017

Scientific Publications or presentations:

- National evaluation of community TB care implementation in Botswana 2014 (*Union Conference presentation*)
- Epi-analysis and Desk Review of Botswana TB control 2014 (*report published*)
- Best practices for roll-out of the GLI Stepwise Process towards TB Laboratory Accreditation 2014 (*submitted for publication*)

Annex II: TB CARE I-supported international visits

Table 4: Technical and management-related trips

#	Partner	Activity Code	Name	Purpose	Planned month, year	Status	Dates completed
1	KNCV	0.0.0.4.2	Caroline Zwaenepoel	Assist in financial & administrative close out procedures of the project and give guidance on pending financial & administrative issues	October 2014	Completed	October 2014
2	KNCV	1.2.1	Jerod Scholten	Supervision & monitoring of local office Support in the development of TB/HIV concept note	August 2014	Completed	August 2014
3	KNCV	2.3.2	Tjeerd Datema	Produce a best-practices document to facilitate the evidence-based, efficient planning of ISO 15189 quality management system implementation in TB laboratories in the future	June 2014	Completed	30 th June 2014
4	KNCV	1.2.1	Jerod Scholten	Support in the aligning of National TB Strategic Plan	February 2014	Completed	February 2014
5	KNCV	2.3.2	Valentina Anisimova	Support in the review of DST SOPS with major input in drug preparation and staff training in preparation of in-house media	February 2014	Completed	February 2014
6	KNCV	1.2.1	Jerod Scholten	Supervision & monitoring of Botswana country office staff Participate in the 2 nd Regional Xpert Forum in Africa as a facilitator	July 2013	Completed	July 2013

#	Partner	Activity Code	Name	Purpose	Planned month, year	Status	Dates completed
7	KNCV		Emmy van der Grinten	Support TB CARE I Botswana office with the development of activities related to TB in the mines in Botswana	April 2013	Completed	April 2013
8	KNCV	2.3.2	Valentina Anisimova	Provide TA to identify the main sources of contamination of mycobacterial cultures significant growth	March 2013	Completed	March 2013
9	KNCV	2.3.2	Valentina Anisimova	TA in scaling up liquid culture, 1 st & 2 nd line DST and the introduction of molecular testing techniques	2012	Completed	2012
10	KNCV	2.3.2	Jerod Scholten	Monitoring & support mission to TB CARE I country office Meetings with the NTP, USAID, CDC, NRL, MOH and PSI	March 2012	Completed	March 2012
11	KNCV	2.3.2	Valentina Anisimova	TA in scaling up liquid culture, 1 st & 2 nd line DST and the introduction of molecular testing techniques	2012	Completed	2012
12	KNCV	1.2.1	Jerod Scholten	Facilitating the action planning workshops (including evaluation of GF R10 TRP comments on Community DOTS proposal and future strategic action planning for GF R11 proposal(or other initiatives)	September 2011	Completed	September 2011